

# Claims

- [c1] A cathode for an imaging tube comprising:  
an emitter emitting an electron beam to a focal spot on  
an anode;  
a backing member electrically disposed on a second side  
of said emitter contributing in formation of said electron  
beam; and  
at least one deflection electrode pair electrically dis-  
posed between said backing member and said anode and  
adjusting positioning of said focal spot on said anode.
- [c2] A cathode as in claim 1 further comprising a front mem-  
ber electrically coupled between a first side of said emit-  
ter and said anode and having an aperture contributing  
in formation of said electron beam.
- [c3] A cathode as in claim 1 wherein said at least one deflec-  
tion electrode pair comprises:  
a first side steering electrode electrically disposed on a  
first side of an emitter centerline; and  
a second side steering electrode electrically disposed on  
a second side of an emitter centerline.
- [c4] A cathode as in claim 3 comprising:

a first side steering electrode insulator coupled between said first side steering electrode and said backing member and isolating said first side steering electrode; and a second side steering electrode insulator coupled between said second side steering electrode and said backing member and isolating said second side steering electrode.

[c5] A cathode as in claim 1 wherein said at least one deflection electrode pair is electrically disposed between a front member and said backing member.

[c6] A cathode as in claim 1 wherein said at least one deflection electrode pair is electrically disposed between said emitter and a front member.

[c7] A cathode as in claim 1 further comprising a plurality of insulators coupled between said backing member and a front member and isolating at least one component of the cathode.

[c8] A cathode as in claim 1 wherein said at least one deflection electrode pair and said backing member are biased to cause current of said electron beam to be modulated.

[c9] A cathode as in claim 1 wherein said at least one deflection electrode pair and backing member are biased to cause current of said electron beam to be cut off.

- [c10] A cathode as in claim 1 wherein the cathode is mechanically symmetrical.
- [c11] A cathode as in claim 1 wherein said at least one deflection electrode pair is biased to cause said electron beam to be asymmetrically extracted from said emitter.
- [c12] A cathode as in claim 1 wherein said at least one deflection electrode pair comprises:
  - a first pair of deflection electrodes; and
  - a second pair of deflection electrodes.
- [c13] A cathode as in claim 12 wherein said first pair of deflection electrodes adjusts position in width direction and width of said focal spot.
- [c14] A cathode as in claim 12 wherein said second pair of deflection electrodes adjusts position in length direction and length of said focal spot.
- [c15] A cathode as in claim 1 wherein said at least one deflection electrode pair form an electron beam passage area therebetween.
- [c16] A method of operating an electromagnetic source comprising:
  - emitting an electron beam from a differentially biased cathode;

generating a dipole field;  
interacting said electron beam with said dipole field and  
differential bias of said differentially biased cathode; and  
asymmetrically biasing said electron beam.

[c17] A method as in claim 16 further comprising modifying  
said dipole field.

[c18] A method as in claim 16 further comprising modifying  
said asymmetrical biasing of said electron beam.

[c19] A non-contact x-ray source component position mea-  
suring system comprising:  
an electromagnetic source comprising:  
at least one electromagnetic radiation source compo-  
nent;  
a probe directing an emission signal at and receiving a  
return signal from said at least one electromagnetic ra-  
diation source component; and  
a controller electrically coupled to said probe and gener-  
ating said emission signal and determining position of  
said at least one electromagnetic radiation source com-  
ponent in response to said return signal.

[c20] A system as in claim 19 wherein said electromagnetic ra-  
diation source component has a target and said con-  
troller determines position of said target relative to an

x-ray tube casing.

- [c21] A system as in claim 19 wherein said emission signal and said return signal are in the form of radiation.
- [c22] A system as in claim 19 wherein said emission signal and said return signal are in the form of electromagnetic radiation selected from at least one of visible light, infrared, ultraviolet, radio, or television.
- [c23] A system as in claim 19 wherein said controller is optically coupled to said probe.
- [c24] A system as in claim 19 wherein said controller is optically coupled to said probe via optical conduit formed at least partially from fused quartz.
- [c25] A system as in claim 19 further comprising an insert wall mechanically coupled within said electromagnetic source and mechanically coupled to and supporting said probe.
- [c26] A system as in claim 25 wherein said controller is optically coupled to said probe via optical conduit and said optical conduit extends through and is sealed to said insert wall.
- [c27] A system as in claim 19 further comprising a hood extension protecting a transmission medium that couples said controller to said probe.

[c28] A method of determining position of an electromagnetic radiation source component within an x-ray source component position measuring system comprising:  
transmitting and directing an emission signal at an x-ray source component target surface;  
receiving a return signal in response to reflection of said emission signal on said target surface; and  
determining position of said electromagnetic radiation source component in response to said return signal.

[c29] An electron beam focal spot position adjusting system for an electromagnetic source comprising:  
(a) a cathode comprising;  
an emitter emitting an electron beam to a focal spot on an anode;  
a front member electrically coupled between a first side of said emitter and said anode and having an aperture contributing in formation of said electron beam;  
a backing member electrically disposed on a second side of said emitter also contributing in formation of said electron beam; and  
at least one deflection electrode pair electrically disposed therein adjusting positioning of said focal spot on said anode in response to a position adjustment signal;  
(b) an anode having a target surface;  
(c) a probe directing an emission signal at and receiving

a return signal from said target surface; and

(d) a controller electrically coupled to said cathode and said probe and generating said emission signal and determining position of said target surface in response to said return signal, said controller comparing position of said target surface with a desired position and generating said position adjustment signal.